111 Center Street Suite 800
Little Rock, AR 72201

May 7, 2010

Alison Nicholas
Arkansas Coordinator for Health Information Technology
1401 West Capital, Suite 300
Little Rock, Arkansas 72201

Dear Ms. Nicholas:

IBM is pleased to present this response to the Arkansas State Health Alliance for Records Exchange (SHARE) regarding creation and implementation of an interoperable health information exchange structure for the State of Arkansas.

With more than 400,000 employees worldwide, IBM has been a strong proponent of health care reform through the application of health information technology. IBM has offices in Little Rock and Bentonville, more than 200 employees and an additional 400 retirees in the State, and we are very interested in helping Arkansas achieve the most cost-effective and efficient healthcare system possible using IBM's proven Health Information Exchange (HIE) solution.

Based on our understanding of the RFI, we have summarized a number of key points and important benefits related to IBM's approach:

- Experience: IBM is a recognized leader in healthcare transformation through technology solutions. Our active participation in NHIN implementations, as well as our long history of implementing healthcare solutions for multiple public and private sector clients around the world, is a clear illustration of this.
- Thought Leadership: IBM has been a vocal advocate for changes to models of care; from provider-centric to patient-centric. We continue to support, design and implement solutions that drive efficiencies and reduce costs across the entire healthcare ecosystem.
- Standards: True interoperability requires adherence to standards and IBM has architected its HIE offering based on industry standards. Any solution we implement with Arkansas will adhere to health IT standards, which will contribute to improved performance and protect your investment.
- Flexibility: IBM's HIE approach provides the flexibility to support dynamic infrastructure requirements of a Health Information Exchange.
- Trusted Solution Provider: IBM offers the State of Arkansas a healthcare innovation provider with a proven track record. IBM's healthcare qualifications and experiences with hospitals, insurance providers, laboratories, and other constituents provide the State with a team that understands the requirements and challenges of servicing all healthcare stakeholders.

IBM values our partnership relationship with the State of Arkansas and we look forward to being part of the SHARE journey. We look forward to discussing HIE solution options in more detail with the State of Arkansas at your convenience.

Thank you for this opportunity and please contact me at (501) 370-2491 with any questions regarding our response.

Sincerely,

Chris Holmes
IBM Regional Executive

Arkansas Coordinator for Health Information Technology

Health Information Exchange (HIE)

Request for Information (RFI)

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May 7, 2010

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RESTRICTION ON DISCLOSURE AND USE OF DATA

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Executive Summary

A Common Vision for Transformation

IBM's Health Information Exchange (HIE) solution is designed to deliver the structure needed to implement the Arkansas State Health Alliance for Records Exchange (SHARE) mission and vision of supporting the development of a mechanism through which clinicians, citizens, public health entities, and payers can share health-related information. The development of the Arkansas HIE will advance secure connectivity and serve as a sustainable, interoperable data exchange platform for health-related information across the State.

This response includes:

- IBM's proven approach to the conceptual architecture concepts described by the SHARE project team
- Our associated health industry solution implementations, including our work on two National Health Information Network (NHIN) demonstration projects
- The technical details of our suggested solution design for Arkansas HIE and the compatibility of our design with standards-based open and secure solutions for health information exchange.

At this time, SHARE is focusing on the development of the infrastructure backbone to provide connectivity and state-wide services for infrastructure, security, data, and transactions. To meet these initial requirements, we propose **IBM's Health Information Exchange Service Provider (HSP) Solution** tightly integrated with IBM's newly acquired company, Initiate Systems, to enable SHARE to meet its stated need for core capabilities including master patient and provider indices, record locator service, security services, patient inquiry and query for documents, using standard protocols. The IBM HSP also includes value-add features such as clinical terminology management, clinician lookup and validation services, personal health record integration, and inter-HIE connections using the standards supported by the NHIN.

IBM agrees with SHARE's phased approach to build HIE services and capabilities. SHARE's desire to address fragmented, inefficient healthcare across the State, starting with the HIE infrastructure backbone, is THE foundational first step to leverage advances in technology to promote greater coordination of the care of individuals who interact with the system.

IBM recognizes that the technology of an HIE is secondary to the business needs of participating stakeholders to derive value from it. The HIE must be based on a **sustainable business model** in order to have the long-term staying power required to achieve its goals of improving the quality, safety, and efficiency of healthcare.

To this end, IBM has developed a comprehensive solution to help address the sustainability of an HIE, meet the requirements for meaningful use and NCQA Medical Home, and ultimately support transformation of the care delivery system.

IBM understands that the world of healthcare delivery is changing and believes that replacing poorly coordinated, acute-focused, episodic care with coordinated management for preventive, acute, chronic, long-term and end-of-life care is foundational to the transformation of any public healthcare system. IBM's robust offering for healthcare transformation is called the **Collaborative Care Solution**, which is a comprehensive solution based on the Patient-Centered Medical Home (PCMH) model. This enhanced care model provides comprehensive and timely care and payment reform, emphasizing the central role of primary care. A key focus of PCMH is delivering value to stakeholders across the ecosystem; including reduction in Medicaid spend (ROI) and achieving true healthcare reform. The IBM HSP is one of the foundational elements of the Collaborative Care Solution.

Our Collaborative Care Solution provides an HIE backbone (IBM HSP) that enables exchange of patient data across the continuum of care, as appropriately defined and securely managed, so that timely patient information is available to the patient's circle of care. In addition, the Collaborative Care Solution includes portal capabilities for improved access, analytics capabilities so that data may more easily support clinical best practices, and, if required Electronic Health Record functionality to facilitate providers gaining additional efficiencies.

IBM's comprehensive Collaborative Care Solution lays the foundation to enable the advancement and improvement of quality of care and patient outcomes, cost effectiveness of care delivery and public health capabilities. We suggest that the State of Arkansas consider this solution in future phases of your transformation roadmap. Since the IBM HSP Solution is the foundational layer of the Collaborative Care Solution, phasing in future components and capabilities is more easily achieved.

IBM has a long history of being a leading system integrator with deep experience in development of HIE, interoperability and standards. Our innovative healthcare solutions have been leveraged for numerous Federal projects, including a serving lead role in the National Health Information Network (NHIN) implementations. Through large implementations supporting health information exchange efforts in Canada, Denmark and other locations, IBM has developed both the HSP and additional Collaborative Care Components.

Details of the Collaborative Care Solution and its value-added capabilities are found in Section 5.3, *Other Features*, for your reference.

In summary, we propose using the IBM HSP as the core infrastructure backbone for the Arkansas HIE. Our capabilities for developing a statewide HIE are noted in detail in this document, and IBM has had extensive involvement in supporting the creation and application of data standards for health information exchange.

IBM's HIE approach is flexible and adaptable. IBM has the unique capability to deliver a hosted Software-as-a-Service Solution, replicate the architecture within your data center, or provide a hybrid. We are recommending a hosted solution, which will be described in detail in this response, for a number of reasons, including the speed at which the system can become operative, and the mitigation of scalability and inevitable regulatory update concerns, for which IBM can assume responsibility on your behalf.

We firmly believe that creating a HIE wrapped around the individual is a fundamental pre-condition for addressing the challenges facing healthcare today. IBM would like to facilitate your healthcare transformation and believes we share a common vision with the expertise and experience to enable the realization of your goals.

We are confident that IBM can enable capabilities to support this initiative in the context of clinical, business, and technology requirements that ultimately must combine for success, and look forward to the opportunity to work with the State of Arkansas as you move forward on this strategic journey.

Our Approach to Meeting Your Goals

IBM's leadership in healthcare technology solutions provides us the experience to recommend an approach that offers the State of Arkansas innovative options to accelerate the delivery of HIE related services and drive towards a patient-centered healthcare model without the enormous challenges of standing up and maintaining the underlying infrastructure.

IBM recommends a Software as a Service (SaaS) approach to facilitate HIE driven healthcare transformation. As noted above, this offering for healthcare transformation is called the **IBM Collaborative Care Solution**. One of the key building blocks of the solution, the **IBM Health Information Exchange Service Provider Solution** (IBM HSP Solution), has been available since 2007, and has been demonstrated to provide the core capabilities for a statewide HIE in the NHIN Trial Implementations program, sponsored by the United States Health and Human Services (HHS) Office of the National Coordinator for Health IT (ONC).

The IBM Collaborative Care Solution offering is differentiated by its approach in balancing health information exchange, clinical and care management applications, patient applications, and decision support and analytics applications. These applications can be hosted by IBM utilizing our SaaS approach, which we refer to as "Cloud Computing," utilizing virtualization, automated provisioning and automated resource and application monitoring to achieve operational and economic efficiencies in the delivery of IT solutions.

This response focuses on the health information exchange portion, IBM HSP Solution, of the overall Collaborative Care Solution, pursuant to your requirements. The HSP Solution may be purchased independent of the other aspects as is described in this response. But it is important to keep in mind the full breadth of the Collaborative Care Solution in evaluating the capabilities and opportunities that the IBM offering provides.

Building business capabilities is about exploiting the infrastructure to provide value added services to the healthcare ecosystem. Integrating healthcare analytics for care alerts at the point of care is a good example. The infrastructure for the HIE is about enabling the core technology components to operate together. In the macro design, components such as the exchange engine and physician and patient portals function as a seamlessly integrated solution, while individual components are replaceable. IBM's iterative design approach will allow SHARE participants to achieve early value and feedback experience gained through ongoing improvements, as each enhancement in infrastructure enables development of additional business capabilities.

In order to achieve high quality healthcare at lower costs through efficient care delivery efficiency and stakeholder collaboration, the following are important technical design principles that SHARE should incorporate while designing and building the Arkansas HIE:

- Respect and maintain consistency with the evolving federal technical standards. Adhere to established healthcare industry standards, such as the technical standards adopted by the Health Information Technology Standards Panel (HITSP) under the direction of the HIT Policy and HIT Standards panels, and the Office of the National Coordinator.
- Leverage interoperability profiles and frameworks defined by Integrating the Healthcare Enterprise (IHE). Insist on staying compliant with the rest of the healthcare industry as additional profiles and standards are implemented.
- Design for flexibility. Achieve current requirements, HIPAA and regulatory compliance, but plan for the expansion and evolving policy, technical, environments as well as growth within the SHARE.
- Design capabilities to optimize adoption by facilitating compelling value creation and access to incentives (e.g. ARRA).
- Develop a system where components may easily be "swapped out" for newer product components. The implemented system must be easily upgraded without requiring extensive and ongoing maintenance.
- Respect security and privacy requirements at all levels (patient, provider, health system, community, state-requirements, and federal compliance) without sacrificing usability or research value of the data. Plan and design carefully so you may respect privacy and security requirements for the many stakeholders, and the many different (future) uses of the data.
- Plan for the secure use of clinical and administrative healthcare data not only across all points of care, but to appropriately support the operational needs of the State. As the healthcare environment within the United States appears to be changing very quickly, plan for local, state and federal regulatory requirements as well as that for your own organization.
- Design to accommodate the primary and secondary use of data that will support multiple levels of reporting, trending, and research.
- Appropriately plan to de-identify and re-identify data. You will not only need this capability for the Arkansas HIE for state and federal reporting, but also to trend organizational reports for public health and research environments, and to provide an avenue for patient follow-up and treatment in specific situations.
- Enable authorized data aggregations that will generate productivity enhancements as a by-product of the Exchange, (data registries, quality of care initiatives, outcomes analysis, public health reporting, bio-surveillance data capture).
- Maximize future growth potential through the community-centric capture of information and data storage, without the requirement of centralized data stores.
- Provide an easy and rapid-to-implement, standard interface mechanism that adheres to industry standards for commonly-used EMR, hospital, practice management, PHR, and best-of-breed systems, enabling current and future interchange of products as the marketplace shifts.

- Utilize easily configurable portals and views for physicians, clinicians and care-givers, governmental agencies, and patients. Integration into the clinical and business workflows will help to drive use and more rapid adoption. A decision needs to be made whether this will be strictly a portal driven solution versus a HIE driven solution that incorporates HIE access through commercial EMRs, PHRs, and a variety of portals as this affects the architecture and the total cost.

IBM will assist your leadership team to tailor these principles to the SHARE environment. We firmly believe that well-defined and communicated principles set the basic foundation for HIE success when shaped by the local business and clinical environment. From these, the final technology solution and architecture can be tailored.

IBM recognizes that the State desires to launch the SHARE initiative with a focused set of capabilities to deliver early value to constituents and mitigate project risks. However, we also recognize that the State may want to allow additional capabilities in the future, as SHARE evolves. We believe our solution offers the State of Arkansas the flexibility to expand capabilities from a common foundation. Some of the possible capabilities that may be of interest in the future, which the IBM solution supports, are:

- Capturing data originating from entities other than those described in this RFI. IBM has worked in a number of environments where traditional and non-traditional data sets have been combined to augment the value of data shared.
- Connecting PACS systems to the Arkansas HIE. IBM plans to add support for the IHE XDS-I profile in 2010, which supports DICOM standards for the exchange of radiology results, including images.

5. VENDOR RESPONSE INSTRUCTIONS

SHARE is seeking information from as broad an array of interested vendors as possible. Therefore, vendors may respond in a manner that presents a complete solution, or may respond to address particular capabilities represented by their solution.

5.1 Mandatory Response Requirements

Respondents shall provide the following information:

1. **Name and Category of Respondent, such as systems integrator, licensee, service provider, hardware vendor, etc.**

   IBM Corporation is one of the world's largest information technology services companies, consisting of the world's largest business and technology services consultancy; hardware company and second largest software company; information technology financing company; and inventor, as measured by patents granted.

2. **Name of Vendor Representative responsible for any future business opportunity with the State of Arkansas. Include contact information. General vendor background and corporate information is not required, but may be included in the Addenda.**

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3. **Summary Description of Solution, limited to three pages.**

   The IBM HSP solution is based on the standards of the NHIN as defined by the U.S. Department of Health and Human Services (HHS) in an ongoing effort that began in 2005. Since the inception of the Office of the National Coordinator for Healthcare IT (ONC) within HHS, IBM has participated in the development and implementation of interoperability standards for healthcare, culminating most recently with the NHIN Trial Implementations project, where IBM's HSP Solution was demonstrated in support of two Health Information Exchanges.

   IBM HSP solution is strictly standards based. This includes technology standards, such as SOAP and HTTP for transport, WS Security and XML Digital Signature for security and privacy, and SAML for distributed user authentication. It also includes healthcare specific format and content standards, such as HL7 messages, and HL7 CDA documents. The solution includes a terminology management for validation and mapping of coded

data elements. The IBM HSP solution supports a variety of content types, and includes the built-in capability to validate against the content standards for summary patient records, lab results, medication histories, and personal health records adopted by the Health Information Technology Standards Panel (HITSP) and the NHIN.

Benefits of the IBM HSP Solution include:

- The HSP provides the capability to electronically move clinical information among disparate health care information systems while maintaining the meaning of the information being exchanged. The goal of the HSP is to facilitate access to and retrieval of clinical data to provide safer, more timely, efficient, effective, equitable, patient-centered care
- The HSP will connect the stakeholders in the healthcare ecosystem and will enable data collaboration, allowing our subscribers derive value from their clinical information
- The HSP will authenticate users and authorize the access to medical information, reducing the risk of accidental or intentional PHI disclosure
- The Initiate Master Patient Index will allow the care giver to locate designated information related to a patient

Relevant Features of the IBM HSP Solution include:

- Secure Messaging and Notification
- Clinical Document Storage
- Security Services
- Inter-Community Services, supporting NHIN standards
- HIE Adapters and APIs:
  - IHE Cross-Community Document Sharing interfaces
  - HL7 v2.x message interface for hospital systems and laboratory results
  - HL7 v2.x Patient Demographic Query and Patient Identity Cross-Reference interfaces
  - Web Service interfaces for user preferences management

The HSP solution and implementation plan addresses the control of patient data for all healthcare entities in the HIE. We offer a hybrid model for storing patients' demographic and clinical data where data is either maintained under the control of the source entity (Federated model) or at the IBM HSP hosted facility (Centralized model). Given the information we have available to date, this proposal is based on the Centralized model.

Figure 1 - Architectural Overview of the IBM HSP Solution shows an NHIN compliant HIE (NHIE) as a Community Hub that is implemented by the IBM HSP Solution. This includes some of the key components of the HIE platform that support SHARE's

requirements. A more detailed description of the IBM HSP Solution and Initiate components is found in Section 5.1.3.

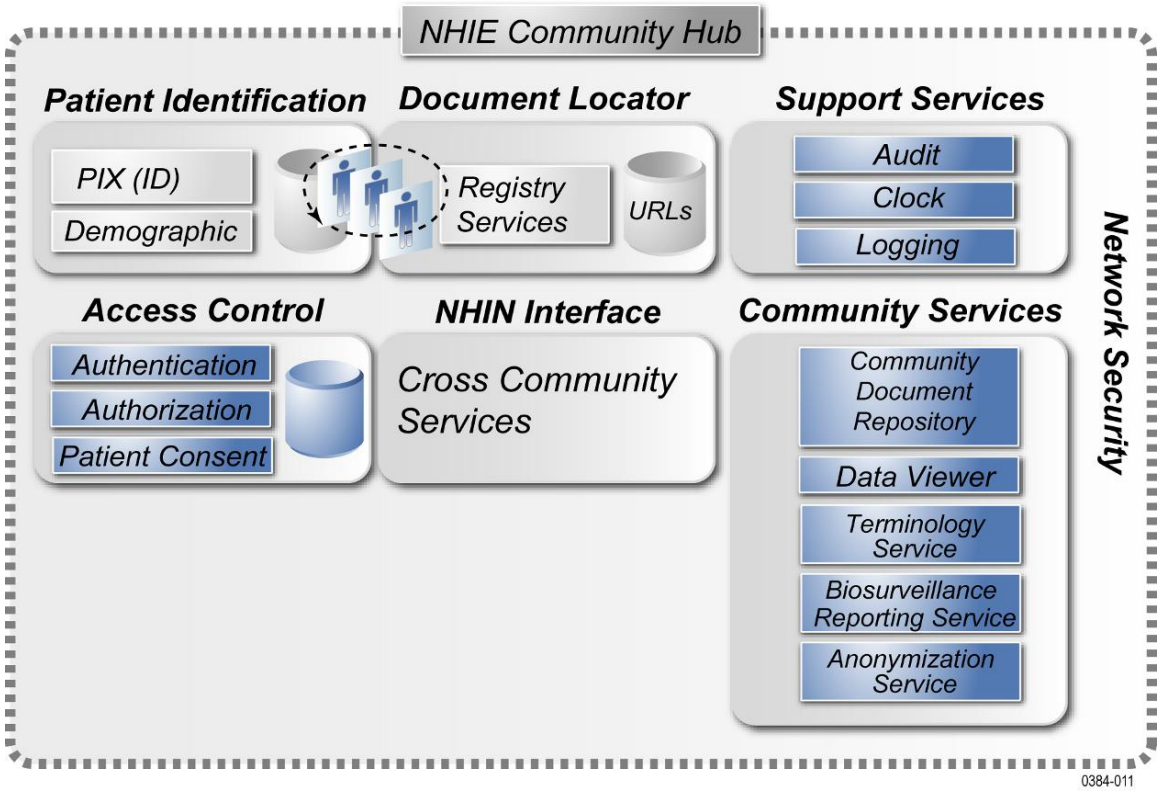

Figure 1: Architectural Overview of the IBM HSP Solution

The solution we propose for the Arkansas statewide HIE combines the capabilities of the IBM HSP Solution and the Initiate Master Data Management software.

The proposed solution provides the flexibility to interconnect single providers, large medical groups, hospitals and hospital networks, state agencies, regional health information organizations, and payers. Regional HIEs and larger hospital networks may choose to connect to SHARE as a "sub-network", using the network-to-network protocols defined and piloted by the Nationwide Health Information Network. The InterCommunity Service Bus of the IBM HSP Solution allows these sub-networks to have one connection point that will support the exchange both within the state of Arkansas and with organizations outside the state through the NHIN. Other organizations may choose to connect directly to the state HIE through the HIE Service Bus provided by the HSP Solution.

4. List of Current Installed Locations for the recommended solution.

The IBM HSP Solution is installed at an Independent Physician Association (IPA) in California.

IBM provided Health Information Exchange services to the North Carolina Health Information and Communications Alliance (NCHICA) in support of the NHIN Trial

Implementations. Connections from North Carolina provider organizations were implemented and extensively tested during the first year of this project, and the system was demonstrated at the NHIN Forum in December, 2008. This implementation utilized the IHE PIX, PDQ, and XDS standards, and the HITSP document standards including HITSP C32 for medication history and summary records, and HITSP C37 for lab results.

IBM's newly acquired company, Initiate Systems, which we are including in this proposal, is the market leader in Master Person Index (MPI) and HIE implementations. Initiate is active in more than 1,700 healthcare sites and more than 40 HIEs in 19 states.

Additional References for Initiate MPI software include:

- Serves as the MPI or client registry in eight Canadian provinces, supporting the pan-Canadian electronic health record
- The pan-Canadian public health surveillance solution and Manitoba's electronic health record project include the Initiate MPI solution and IBM Healthcare Image and Information Grid (HIIG), a standards-based framework for medical image and patient data archiving and interchange using the IBM Grid Medical Archive (GMAS),
- Supports six Nationwide Health Information Networks (NHIN II) and all of the NHIN I demonstrations funded by the US Office of National Coordinator (ONC)
- Is MPI provider for the US Veterans Administration Hospitals
- Supports major U.S. retail pharmacies, including Walgreens, Kroger, Wal-Mart, CVS/Caremark and SureScripts
- Provides clients like UMass Memorial, a healthcare system with $1.4B revenue, with Interoperable Health Solutions to enable their move from a predominately paper environments to an electronic one.

5. Estimate of implementation timeline: Pilot project and broader installation.

Core Infrastructure Roll-out and Timelines

IBM's lead offering is the IBM HSP Solution as a multi-tenant, software-as-a-solution offering. The production version of the IBM HSP Solution is currently operating in an IBM data center. IBM would expect to create (within the hosted solution) the software and database instances required to support the Arkansas HIE in fewer than 30 days.

There are several other activities that would have to occur prior to connecting healthcare organizations in Arkansas to the HIE. These activities include:

- Develop a User ID management strategy (synchronize user IDs, and develop requirements that allow for distributed user authentication).
- Develop a Patient ID management strategy (generally described by standard interfaces, we recommend documenting patient ID requirements and procedures for different user types).

- Establish the standard or default privacy and access control policies for access to information in the Arkansas HIE, and establish the boundaries within which patients and providers may establish policies limiting (or granting) access to information about themselves (for patients) or created by them (for providers).
- Document the standard HIE interfaces to the IBM HSP Solution, and modifications to those standard HIE interfaces for the Arkansas HIE.
- Develop the detailed adoption and roll-out plan for healthcare organizations (providers) in Arkansas.

These activities would be expected to occur in parallel with the establishment of the HSP Solution instances to support the Arkansas HIE, though they may take longer than 30 days, depending on the degree of participant involvement and public feedback that SHARE wishes to include.

In our experience, however, the most significant factor that will drive the implementation timelines is the willingness and technical readiness of the participant organizations in Arkansas to begin exchanging information on the Arkansas HIE. We are aware that SHARE has had the significant involvement of many healthcare organizations in creating the Plan for Statewide HIE. We are not aware, however, of the extent to which these inclusive planning efforts will translate into a willingness to actually share clinical information on a statewide network. And even when there is a willingness to share clinical information, there are likely to be significant technical barriers to participating in the type of standards-based exchange that you are asking for in this RFI and that the IBM HSP Solution is designed to provide.

Project Staffing and Client Responsibilities

Consistent with the software-as-a-service model of our offering, the services required to connect participants to the HIE and administer and operate the HIE are included in the subscription fees for the IBM HSP Solution. We would propose a dedicated Project Manager to act as the single point of contact for SHARE to the HSP Solution. The staffing model for the HSP Solution includes development staff, a security officer, training staff, release managers, a Project Management Office (including finance, procurement, and accounts receivable functions), business analysts, and network, systems, and database administrators. This staff will support the adoption and operation of the Arkansas HIE.

SHARE resources, or staff of the organizations joining the Arkansas HIE, would be expected to perform at least the following activities:

- Establish the privacy policies for the Arkansas HIE and communicate those policies to IBM.
- Develop the necessary contractual and/or business associate agreements with Arkansas provider organizations to handle protected health information; work with IBM attorneys to extend those contractual arrangements to cover IBM and its subcontractors.

- Participate in the establishment of User ID management and Patient ID management policies.
- Review the standard IBM HSP interface requirements and establish unique interface requirements for the Arkansas HIE.
- Act as the primary point of contact for the providers and other organizations that wish to join the Arkansas HIE; communicate the Arkansas HIE interface requirements and security and privacy policies to provider organizations; establish priorities for the order in which willing provider organizations should be connected.
- Work with Arkansas providers to upgrade their systems to meet HIE interface requirements; alternatively work with the provider or a regional extension center to build an adapter to allow the system to meet the HIE interface requirements.

6. Description of the Financial Business Models supported.

As IBM's portfolio of HIE solution capabilities continues to evolve and expand, to address new standards-based technical and business requirements across a range of healthcare entities, we are adapting and refining our financial business models.

IBM's solutions can be configured to support a transaction fee model, or our recommended subscription model. While a utility model can also be utilized, it is imperative that end users receive value for their investment. We believe that the subscription model, focused on the delivery of value-added services which support the reform of our healthcare delivery system, ultimately reduces the cost of healthcare. The potential to reduce Arkansas' Medicaid spending, through HIE supported Care Management of risk populations could provide substantial reinvestment opportunities for sustainability.

IBM is very focused on helping HIEs generate revenue and develop and maintain sustainable funding models independent of grant or other one time sources of funding. We have been studying sustainability for some time, and below provide examples of some of our research on this topic. These examples have shaped our current recommended financial business model for SHARE, enabled by IBM's Collaborative Care Solution (with HSP as a core set of components).

Western North Carolina Health Network, an HIE comprised of 16 contiguous counties, is an instance where IBM and its IT partners implemented the infrastructure for a new HIE named WNC Data Link. IBM developed an initial HIE Sustainability Plan in 2007 followed by an update in 2009 to incorporate new legislative measures contained in the ARRA. The WNC Sustainability Plan conservatively documents projected cost savings and revenue generation over an eight year period for each of the HIEs financial stakeholder groups (large, medium, small hospitals, physician practice groups, payers, employers etc.). By following IBM's recommended strategy, WNC DataLink steadily realized positive ROI (not including the period covered by one-time grant funding). The HIE governance board decisions were guided by IBM's recommended HIE roadmap emphasizing adoption in high use areas (e.g., Emergency Departments and primary care

internists) and by "frontloading" popular high-value initiatives (e.g., lab results, discharge summaries, medication history, etc.).

This "speed to value" approach at WNCHN became the focus of a recent IBM commissioned independent case study[1] by Forrester Research which conducted interviews with WNC Data Link administrators and users and based on historical analysis their assessment identified positive value across four domains: Operational/financial, Brand, Societal and Innovation. Their assessment of benefits included:

- 40% efficiency savings from faster record access.
- 20% reduction in the costs to share and transfer patient records.
- 15% reduction in duplication of preoperative lab tests.
- 5% reduction in medical errors from faster access to accurate and up-to-date patient information.
- Identified potential misuse of prescription drugs.
- Improved quality of care within emergency room visits.
- Managed health inequalities across the region.
- Improved overall chronic disease management.

Quoting from the Forrester report, "Table 1 illustrates the risk-adjusted cash flow, based on data and characteristics obtained during the interview process. Forrester risk-adjusts these values to take into account the potential uncertainty that exists in estimating the costs and benefits of a technology investment. The risk-adjusted value is meant to provide a conservative estimation, incorporating any potential risk factors that may later impact the original cost and benefit estimates.

Table 1: Summary Three – Year Financial Impact – Risk Adjusted

Summary Financial Results	Risk-Adjusted
ROI	123%
Total costs (PV)	3,309,091
Total benefits (PV)	7,380,422
Total (NPV)	4,071,331

Table 1 Source: Forrester Research, Inc.

A further example of economic impact on a state basis is derived from a study IBM conducted as part of the NHIN Trial Implementations consisting of an eight-year cost benefit analysis across multiple projected HIEs in the state of North Carolina (2009).

[1] Prepared for IBM by Forrester Research, Inc., March, 2010, The Total Economic Impact™ Of IBM Smarter Planet Solutions For Healthcare A Single-Company Analysis by Jon Erickson and Balal Ahmed.

This deliverable was singled out from presentation at an ONC sponsored NHIN Public Forum. It concluded that with the proper prioritization of initiatives and cost effective implementation of core shared services (e.g., EMPI and provider registries), the projected 19 small, medium and large sized HIEs within the state could achieve long term sustainability. Quoting the opening paragraph from the NCHICA sponsored NC HIE Sustainability Plan[2]:

"North Carolina is facing an unsustainable escalation in healthcare costs. In order to drive more value for North Carolinians and all of their healthcare stakeholders, a more secure, modern, connected approach to providing clinicians with patient information is required. This integrated approach is referred to as Health Information Exchange (HIE), the electronic movement of health-related information among organizations according to national standards. This document outlines a financial and operational use of HIE to deliver breakeven by 2012 and an aggregate benefit to the state of $2B to $3B a year by 2015 through improved quality of care, increased patient safety, efficient use of limited resources, streamlined administrative workflows and reduction in waste across the state of North Carolina."

The following illustration shows the assumed sequence of prioritized initiatives implemented statewide on an individual HIE level at various starting points over the eight year period.

[2] NCHICA NHIN Trial Implementations Sustainability Plan for NC, January, 2009, developed with support of HIE technology partner, IBM.

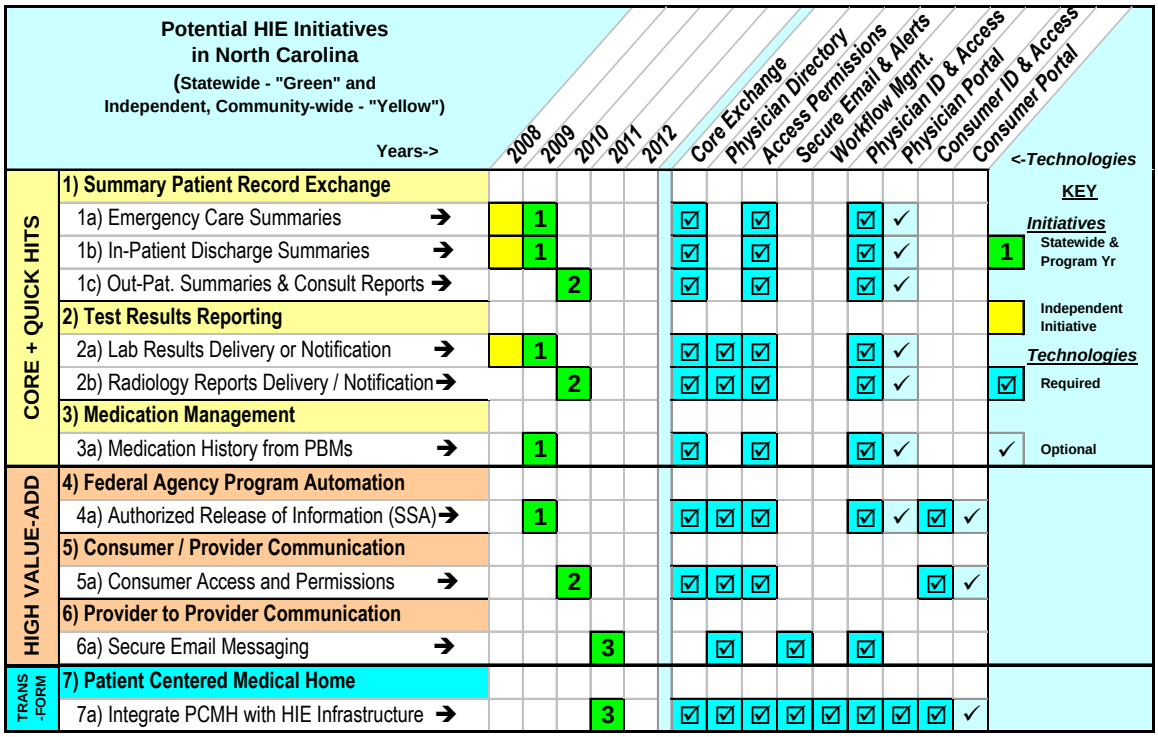

Figure 2: Illustration Core, Value-Add and Transforming Candidate Initiatives

While the above focus on regional and state implementations of clinical initiatives, IBM is actively developing solutions and advocates planning on state and local levels for even greater revenue generating potential of applying automation to the administrative or payer business processes.

At the same time IBM is actively involved with several Federal agencies associated with healthcare as they collaborate on the health reform movement. Current projects which IBM is engaged in are driving significant efficiencies by leveraging the NHIN infrastructure. They include the adjudication of disability claims applications with the Social Security Administration and the preparing and exchange of documentation to "transfer care" of elderly and chronically ill patients to nursing home and other long term care facilities.

IBM's HIE solution including the HSP as part of the broader Collaborative Care Solution are focused on creating value for stakeholders across the healthcare ecosystem (e.g. providers, payers, individuals and State) by rolling out capabilities that begin with the foundational layer of facilitating data exchange.

The following capabilities are critical to developing sustainable business value for HIEs and guide our solutions:

- Information Exchange to integrate patient data across the continuum of care; Population analytics and clinical decision support to support integrated, comprehensive and coordinated care processes;

- Care team portal to support the physician and care team workflow (creating a stronger ongoing relationship with patients to facilitate appropriate preventative care and disease management);
- Risk and Outcomes Management to enable sustainable business model coordination and creation of accountable care organizations.

7. Suggested Service Level Agreement terms.

The HSP Solution provides defined service level objectives for systems availability and response times along with a staffed service (help) desk. Service desk support is a separately negotiated option.

Availability: The service level objective for the HSP System is 99.5% up time, including planned outages.

Service Desk: The service desk is staffed during normal business hours of the client with the option to negotiate other coverage arrangements.

Incident Management: The IBM defined Incident Management Process is followed for user-reported IT incidents as well as user-related requests like requests for general IT information or request for status. Principally incident management is used to detect and capture the failures that arise in managed IT environments either via automated monitoring performed by Event Management or user identification. A key to this activity being successful is to quickly, accurately, and completely recognize potential failures at the time of their occurrence and to accurately record user and incident information.

Each incident ticket is assigned a Severity Level based on business impact ranging from critical (severity 1) to none (severity 4). Service level objectives for responses start at 15 minute acknowledgement and 4 hour fix or work around for critical defects and 2 hour acknowledgement/multi day fix/work around targets for severity 4 incidents.

8. Rough Order of Magnitude Cost of Solution Components.

In general when responding to RFIs, IBM does not release specific pricing for its solutions. For this Arkansas HIE RFI we provide below an explanation of our pricing model and methodology. Once specific requirements are defined in a formal RFP, IBM will gladly present pricing if our solution meets the requirements/functions requested.

The market pricing included is not in anyway an illustration of IBM's price but is included to support SHARE's efforts to appropriately size their HIE initiative.

Pricing Methodology

IBM believes that a hosted HIE solution offered via a subscription pricing model based on the number of users, by type, provides Arkansas with the flexibility to derive competitive pricing and maintain current and planned capabilities. We recognize that the uncertainty in the current HIE market may impact current solution pricing as legislation,

policies and procedures, and overall understanding of use matures over the next decade. A hosted model where your service provider manages the solution currency as part of your contract will reduce the State's risk of having the resources to keep up with market change. The subscription model further allows for flexibility in how usage is calculated. If contributions from providers to access the HIE are assumed, then variable costs associated with increased adoption would be off set by funds received that would be linked to subscriptions fees for HIE use. To provide the services described in this RFI the subscription fees should be based on:

A per user per month fee for the HIE connection, and

- An additional fee for complementary functions like an integrated PHR application or analytics or clinical decision support, and
- A onetime charge per user or type for establishing the HIE Connection

For an existing Regional HIE or large hospital network that connects as a "sub-network" following standard protocols, the cost would be based on the volume per connection. Consequently the cost to both the subscriber and the State would be minimized, and increase the ease of adoption for large groups of users.

Estimates can be based on a mutually agreed to adoption schedule, which identifies minimum baseline expectations for use and incremental charges after the baseline is met. Alternately, an estimated adoption schedule with adjustments to fees at calendar milestones can also be considered, where incentives can be linked to higher adoption.

The fee schedule includes a minimum base monthly subscription fee charge equivalent to actual or forecasted users for the HIE and other components of the solution, plus a onetime per connection installation fee. Over the life of the contract the total commitment increases as providers connected to the system increase.

For an existing Regional HIE or large hospital network that connects as a "sub-network", these connections would be priced not on a per physician basis, but based on the volume per connection.

Adaptor Costs

While standard connection protocols to the HIE are preferred, many communities include a plan for custom adaptor fees. Generally speaking, SHARE should consider delivering a standards based solution to its constituents. To the extent that required inbound and outbound adaptors comply with these standards, the cost for testing and deploying connections should be included in the subscription fee model. In the event that Arkansas stakeholders require a custom adaptor for non-compliant systems IBM would scope the development and provide either the SHARE or the individual stakeholder a cost estimate based on forecasted effort and established rates.

Acceptance

At project start-up, Arkansas should define acceptance criteria and a "Service Ready Date" for the HIE Solution and any other related projects or components. The "Service Ready Date" is the date that the solution will be ready for production use by Arkansas HIE participants. At that point, we would demonstrate the solution for the State and on completion of the demonstration, the charges described in your pricing model would begin to accrue.

Termination

You should expect to see termination charges in your standard contract in the case the State or their designee terminates the contract for convenience. Termination charges are typically 12 months of monthly charges, based on the highest number of billing providers who have activated the service up to that time.

Industry Norms

While rate structures vary, the market is guiding solution vendors to a Per Provider Per Month subscription model. In addition to regular subscription fees, it is typical to expect a one time implementation fee for each user to establish their access to the HIE (to cover local connection support).

Market analysis suggests that in similar implementations vendors charge between $60 and $120 per provider per month (PPPM) for core HIE services. Additionally, a one time implementation fee of $1000 to $5000 for each user to establish their access to the HIE is assessed to cover local connection support. At this time, final requirements and solution environment details are not understood, so much of this pricing variation has to do with what features will be required for the HIE.

While the State can apply the above numbers to its population of providers, it would miss opportunities to leverage efficiencies that may be available to participants. Providing the vendor community your assumptions on the State's provider profile during the RFP process will not only allow for easier comparative analysis for response evaluators, but also begin to establish incentives for providers to work together.

For example, while Arkansas currently has 65,000 licensed health services providers in the state and 103 licensed hospitals, many would be provided access either through physician practice employment or hospital employment/affiliation. Of that number, the Arkansas State Medical Board lists 8640 as licensed physicians. Deeper understanding of anticipated organization patterns will facilitate development of pricing models.

Pricing for system aggregators will be driven by the level of service they provide, i.e. ability to fully manage the connection to SHARE on behalf of their members, and the anticipated data traffic they will generate (usually driven by organization type and size e.g. Hospital vs. Payor).

Variables which should be considered:

- What number of providers will require direct, independent access to the HIE?
- What number of providers currently integrating EMR data will be able to connect to the HIE from a single integration point? How many single integration points can be considered (e.g. group practices, physician-hospital networks, RHIOs, etc)

  Single points of integration should be able to manage a standards based adaptor to the HIE.
- What adoption rate does SHARE believe will be achievable during the terms of the contract?

It is to the State's advantage to drive the consolidated model in order to reduce costs, and transfer the management of the individual physicians to a regional or healthcare entity.

If advanced application functionality like PHRs and EMRs are required for the solution, the fees are dependent on the richness of features and functions required. These additional components can however be offered a la carte to stakeholders who will have different expectations for their experience with the HIE. In all cases, the more value and positive impact to their practice/ delivery of care that an end user (physician or hospital) receives from their participation in the network, the more likely they will be willing to contribute to the cost of the service.

This content regarding price is not meant to be a formal proposal. We look forward to responding to a formal Request for Proposal when more specific requirements for SHARE are made available.

5.2 General Solution Description

This section should build on the Summary Description of Solution. It should describe how the solution addresses each of the following elements described in Section 4, Descriptive Information about the Arkansas HIE:

1. Interoperability

The IBM HSP Solution to deliver a statewide HIE backbone is:

- EMR vendor agnostic
- Supportive of multiple communication protocols, within reason (SOAP, MLLP, etc).
- Consistent with technology standards (for example, web services) and healthcare industry standards (for example, HL7 and IHE document sharing)
- Highly secure, with privacy enforced through fine-grained policies, with built-in policies to allow access to information for treatment purposes.
- Supports distributed user authentication and user administration, and delegated user authorization.

IBM has been a strong supporter of world-wide industry events sponsored by Integrating the Healthcare Enterprise (IHE) aimed at validation and demonstration of IHE profiles and the underlying standards they are based upon. IBM has demonstrated interoperability with more than 58 vendors, including major medical IT vendors such as GE Healthcare, Siemens, Kodak, and McKesson. IHE events where IBM has participated and successfully demonstrated connectivity since 2006 include:

- IHE Connect-a-thon North America
- HIMSS – IHE Interoperability Showcase
- Radiological Society of North America – IHE Demonstration
- American College of Cardiography – IHE Interoperability Showcase
- IHE Connect-a-thon Europe
- Canada eHealth Conference – IHE Interoperability Showcase

IBM has also successfully tested IBM NHIN Gateway at the NHIN cooperative exchange testing events in 2008 and has also demonstrated American Health Information (AHIC) use cases in both the AHIC and NHIN Forum demonstrations.

2. Technical Architecture and Approach

The IBM HSP Solution is comprised of a number of software components that implement several IHE Integration Profiles. These components, which form the backbone of the IBM HSP Solution Architecture, are integrated using a Service Oriented Architecture implemented as J2EE applications in IBM WebSphere Application Server, with data storage using IBM DB2 Universal Database. These components are supported by an end-

to-end security model that includes authentication, authorization, fine-grained access control, and auditing.

Although these core components are tightly integrated, data storage and application services are provided to these applications through a modular interface, implemented using J2EE standard Java Connector Architecture. This modular design allows individual resource applications, such as a Master Patient Index application, healthcare terminology application, or document repository, to be plugged in replacing the built-in component of the IBM HSP Solution.

3. Design Principles and Requirements

The IBM HSP Solution utilizes an ***SOA-based, document-centric***, and ***standards-driven*** architecture to allow our clients to deliver a ***patient-centric*** and ***EMR-agnostic*** HIE that is ***highly scalable*** and ***highly secure***.

SOA-based: The design of the IBM HSP Solution is built on Service Oriented Architecture principles and implemented using IBM's industry-leading middleware. Access to the HIE is primarily through a set of web services, incorporating standard web services, and web services that IBM has defined in areas where standards do not exist. Internal components are also designed with service interfaces and components communicate with each other over these interfaces. Useful capabilities of these interfaces can easily be exposed to external applications, such as applications owned by our HIE clients and their member organizations.

Document-centric: The IBM HSP Solution embraces the document-sharing paradigm for the exchange of clinical healthcare information described by a group of profiles from Integrating the Healthcare Enterprise (IHE). These profiles define standard protocols and message formats for exchanging clinical documents (XDS profile), reconciling patient identities (PIX and PDQ profiles) and auditing transactions that carry protected health information (ATNA profile). IBM agrees with the philosophy of the IHE document-sharing profiles, that a clinical document is a better "unit of exchange" for sharing healthcare information among healthcare providers, government healthcare organizations, and consumers of healthcare services, as compared to the exchange of discrete data elements in an HL7 message.

The IBM HSP Solution also recognizes that some applications that need to participate in the exchange of healthcare information are not capable at this time of supporting the IHE-defined document sharing protocols. The IBM HSP Solution provides a set of adapters that support standard protocols widely used for sharing clinical information, incorporating HL7 v2.x messaging and NCPDP Script for carrying pharmacy information. (Support for NCPDP Script is currently planned to be available in the second quarter of 2010.) These adapters provide the ability to convert data from the native format into HL7 Clinical Document Architecture (CDA) documents. Support is provided for conversion to the standard document formats adopted by the U.S. Secretary of HHS, as defined by the Health Information Technology Standards Panel (HITSP).

Standards-driven: In addition to the healthcare standards just described, the IBM HSP Solution is based on several IT standards that represent the best practices for developing IT applications today, and the current techniques for securely sharing sensitive information over the Internet. The application architecture is based on open standards such as J2EE, Enterprise Java Beans, and JDBC. Secure exchange of information conforms to the Web Services Interoperability (WS-I) standards that define the transport and security protocols for exchanging information over a public network. Amongst these protocols are SOAP, HTTP, SSL/TLS, Web Services Security, XML Digital Signature, and SAML. More detail on standards can be found in Section 5.3 Other Features.

Patient-Centric: The IBM HSP was built from the ground up with the concept that the patient is a first-class user of the HIE services, not simply the subject of clinical information. The system supports the appropriate security controls to give the patient secure access to their own clinical information, and allow them to delegate those access rights to another user, such as a family member, on their behalf. In addition, the IBM HSP allows patients to create fine-grained policies to govern access to their clinical information, restricting access based on the requesting user, the user's role, the type of clinical data, and the purpose of the access request. Further, IBM has connected two Personal Health Record applications to the HSP Solution during the NHIN Trial Implementations, and works with Personal Health Record application vendors to develop standard mechanisms for exchanging not only clinical information, but also to exchange access consent policies and advanced directives such as living wills and healthcare powers of attorney.

EMR-agnostic: IBM does not incorporate an EMR application with the IBM HSP Solution, and has worked with many of the EMR vendors that sell products in the U.S. today. We believe that one of the strengths of our HIE solution is that EMR vendors are willing to work with IBM to connect their products to our HIE infrastructure, since they know that IBM will not compete with them for EMR customers.

Highly Scalable: The IBM HSP Solution is built on IBM's industry leading middleware suite, such as IBM WebSphere Application Server, IBM Tivoli Access Manager, and IBM DB2 Universal Database. These products provide both horizontal and vertical scalability with very little disruption to ongoing operations:

- Horizontal Scalability is achieved by allowing particular applications and services to run on one or more nodes within the WebSphere cluster, effectively distributing the workload across servers.
- Vertical Scalability is achieved by support for a wide range of hardware platforms, from IBM xSeries (Intel-based) servers, to mid-range servers running UNIX or Linux operating systems, and up to IBM Mainframe systems.

The need for scalability is one reason that we are proposing a hosted option for SHARE infrastructure – the IBM HSP Solution. With IBM hosting and operating the HIE infrastructure, Arkansas will be somewhat insulated from the administrative, technical and operational implications of scaling as additional providers, organizations or connections to other networks occur.

Highly Secure: Security, Privacy and Confidentiality within an HIE are addressed through several mechanisms to provide end-to-end security and privacy of data and transactions within the IBM HSP Solution. The HSP security model is based upon the published federal standards and meets the Security and Privacy requirements laid out in HIPAA and the HITECH act. The HSP security controls utilized reflect the controls detailed in applicable NIST Guides. In order to meet the minimum necessary privacy components as well the enhanced HITECH requirements, IBM has developed a robust monitoring support and data breach investigative and notification capability. A key aspect of the security model of the IBM HSP Solution is that no users are authorized to scan or perform blanket queries against the data accessible through the HIE. This allows for separation and segregation of access, as required within both the Security and Privacy portions of HIPAA. So although the HIE makes available the healthcare information contributed by its member providers, there is no ability for users to troll the information for purposes of research or marketing. The IBM HSP Solution does provide the capability to extract clinical data into a data warehouse to support research uses for HIEs that wish to exercise those uses and the security controls that are required to do so.

The IBM HSP is consistent with the standards of the Nationwide Health Information Network (NHIN). The HSP implements the capability of an NHIN Gateway, which will allow participants of SHARE to have access to clinical information from across the nation as more providers in more states join the NHIN. Access to clinical data within SHARE by requesters through the NHIN is governed by access control policies implemented in the HSP – so Arkansas provider organizations can decide who will be allowed to access their clinical information, and under what circumstances. The HSP access control policy engine is further described in the next section.

The IBM HSP Solution is comprised of a number of software components that implement several IHE Integration Profiles. These components, which form the backbone of the IBM HSP Solution Architecture, are integrated using a Service Oriented Architecture implemented as J2EE applications in IBM WebSphere Application Server, with data storage using IBM DB2 Universal Database. These components are supported by an end-to-end security model that provides for authentication, authorization, fine-grained access control and auditing.

Although these core components are tightly integrated, data storage and application services are provided to these applications through a modular interface, implemented using J2EE standard Java Connector Architecture. This modular design allows individual resource applications, such as a Master Patient Index application, healthcare terminology application, or document repository, to be plugged in replacing the built-in component of the IBM HSP Solution.

4. Architectural Overview

The IBM HSP Solution is offered through a “software as a service” model. Base service components consist of components that are dedicated for exclusive use by a specific HIE client and components that are shared between a number of HIE clients. We also leverage shared network and security infrastructure components to reduce cost, and allow

for the efficient addition of additional HIEs client. (As an option, a client may choose to have dedicated network and security components at an additional cost.)

A key step in our deployment model is technology enablement of all the participants within an HIE, and assisting them to identify the current technical infrastructure and develop a migration path to become an NHIN-enabled HIE (NHIE). It is critical to confirm that organizations within each participating community can support exchange standards and data standards of the NHIN, so the HIE can set expectations on the quality of the data that will be accepted, transported, or delivered to participants across the network.

The IBM HSP Solution architecture utilizes the principles of Service Oriented Architecture (SOA), coupled with an Application Architecture modeled on a traditional three-tier web infrastructure. At the center, or "business layer", application logic is represented as a series of tasks, or "services". The IT functions that support these services are then linked together in a flexible manner to allow business processes to efficiently gain the maximum use of information, applications, connectivity, and IT resources.

At the "data layer", each data repository, specialized application, or online service is accessed through a Resource Adapter that is controlled through the IBM WebSphere Application Server infrastructure. Physical location of the data store or service is isolated from the business logic, allowing flexibility in deployment architecture and in the choice of service provider for certain "commodity" services.

At the web layer (or "client interface" layer), various standards-based and proprietary interfaces are available to allow integration into the HIE by a variety of means. Clients may connect through an HL7 v2 message interface, an IHE Document Sharing interface, or a proprietary Web Services interface (designed for certain operations for which there are no widely adopted standards). In addition, a web application module has been created to provide secure, read-only, web-based access to HIE participants who do not have a standards-based electronic medical records systems implemented.

In addition, the web layer supports the interfaces connecting the IBM HSP Solution to other Health Information Exchanges, using the standard interfaces identified and developed by the NHIN Cooperative Working Groups.

Figure 3 shows the HIE that forms the core of the IBM HSP Solution, including some of the key services and adapters that are required to implement the AHIC use cases.

The core services of the HIE manage the workflow and communication of information (including patient-centered clinical data, resource utilization information, and patient demographic data required to accurately identify patients) among authorized parties, including healthcare providers and public health entities. Services use healthcare IT standards to support the sharing of information among these entities, and are designed to reflect whatever rules and policies are in place for sharing of patient and institution information.

Our deployment plan addresses the control of patient data for the communities within the HIE and influences the location of stored patient data. We offer a hybrid model for storing patient's demographic and clinical data where data is either maintained under the control of the source entity (Federated model) or at the IBM HSP hosted facility (Centralized model), at the choice of each provider organization.

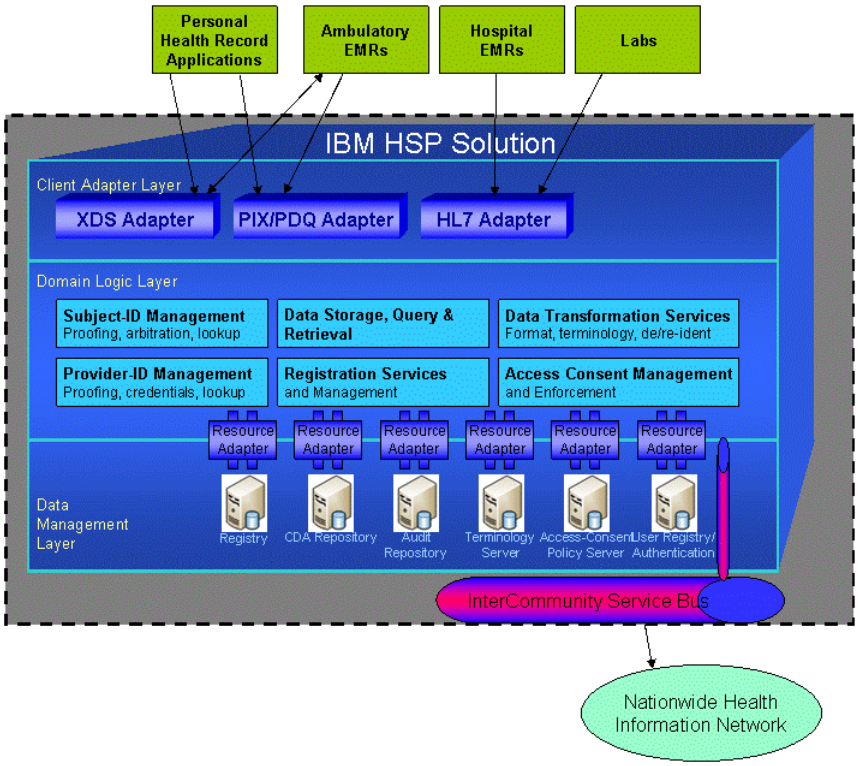

Figure 3: IBM HSP Solution Architecture

Solution Components

The **IBM HIE Document Registry** implements the XDS Document Registry actor. This component provides record-locator service for the HIE.

The **IBM HIE Document Repository** implements the XDS Document Repository actor. This component provides centralized document storage for the HIE, though any HIE participant may elect to provide their own instances of a Document Repository, which would then be integrated to the IBM HSP solution through the standard IHE-defined interface.

The **IBM HIE Intercommunity Services** component allows the HIE community to search for patients and documents within other HIE through the Nationwide Health Information Network (NHIN). It uses the same standard protocols specified by IHE, but issues these queries against other registered HIEs to resolve queries that cannot be satisfied within the local HIE.

The **Identity Management Service** implements the IHE Patient Identity Cross-Reference Manager and Patient Demographics Supplier actors (from the PIX and PDQ profiles). This component is often referred to as an Enterprise Master Patient Index, or eMPI. The HSP Solution includes an implementation of a Master Patient Index using IBM's Initiate Systems software. Alternatively, the solution's pluggable resource adapter layer allows any HIE to replace the IBM implementation with a customer-owned eMPI system. IBM's recent acquisition of Initiate has afforded us a number of opportunities to build skills for Initiate as the eMPI component in our solution design. IBM recognizes the need to adapt flexibly to clients preferences around specific components and will utilize whichever solution best meets the overall needs of the State.

The **Access and Consent Management Service** implements consent management for the HIE. It provides services that allow patients, providers, and provider organizations to record consent directives (statements about who should be allowed to access their clinical data for what purposes) and contains a runtime component that enforces those directives when a request is made to access a clinical document. The Access Consent Management Service provides a flexible model that handles fine-grained and complex policies for Access Consent, utilizing patient, document, provider, community and clinician policy specifications during configuration and delivers strict policy enforcement during runtime.

Data Transformation Services provide the ability to convert HL7 messages to Clinical Documents conforming to the HL7 CDA and CCD specifications. The Data Transformation Services combines messages into documents covering an episode of care, and accounts for updated content such as amended or final lab results. In combination with the HL7 client adapter, this capability provides flexibility and allows for a custom pre-processor, unique for each data source, to convert messages to a "canonical" HL7 format that can be translated into CDA.

The **Messaging and Notification Services** provides the ability for user's to subscribe for a "push" of information to them, based on preferences for (a) the type of notification they wish to receive, and (b) the mechanism through which they wish to receive those notifications. The subscription is integrated with the Access and Consent Management service; so that users are not allowed to subscribe to information that they are not authorized to receive on a query-response basis. The notification capability is extendable to include a wide variety of notification types, but initial support is provided for the ability to be notified about the existence of new clinical documents for a patient (for example, when a referral has been completed), and for the ability to be notified about lab results (such as for a specialist who needs to see results ordered by another physician). Based on the notification delivery mechanism, the clinical information can be included with the notification, or the notification can include a link that is used to later retrieve the clinical information.

The **IBM HSP Administrative Portal** provides the single point of access for managing applications as well as a single point for configuring the HSP Solution for each HIE client. In addition to managing the various components of the HIE, administrative

applications such as Patient Registration, Clinician Registration, User Management, and Event Auditing are accessed through the Administrative Portal.

Deployment Model Considerations

We have developed the IBM HSP Solution (and the IBM Collaborative Care Solution) to be delivered under a hosted "software as a service" deployment model. IBM has leveraged many of the emerging principles of "Cloud Computing" in the design and development of the HSP Solution. Some of the reasons why we believe this model is advantageous for customers of the solution include:

The environment for Healthcare IT and health information exchange is highly dynamic, with several competing, emerging standards and significant investment likely in the next several years. In this environment, frequent upgrades to software interfaces and implementations are likely, and these upgrades can be delivered to our customers more quickly under software as a service model than in a traditional packaged product model.

As HIT evolves over the next few years, skills required to administer and maintain HIT and HIE systems are likely to be very scarce in the U.S. HIE projects are likely in most, if not all, of the 50 states and 6 territories. Centralizing administration of systems and interfaces means that IBM can hire and retain the skilled resources that will be required to keep the SHARE operating at the required levels of service.

Capital investments required to establish a statewide HIE are likely to exceed the funding available from the federal stimulus program. The software as a service model will allow Arkansas to acquire more capabilities than if it had to purchase hardware and software.

IBM can leverage economies of scale by securely sharing selected infrastructure pieces across all of our HIE customers. Under the multi-tenancy model of the IBM HSP Solution, some components, such as data storage and application and interface instances, will be dedicated for SHARE. But other components, such as healthcare terminology services, and federated identity management services, can be centralized, resulting in significantly lower software implementation costs, without compromising security or response time.

For all of these reasons, the Cloud Computing model is likely to reduce the total cost of ownership of the HIE for the State of Arkansas. However, the IBM HSP Software can be deployed in a traditional "on premise" model, and if the State of Arkansas selects this deployment option, IBM will work with the State to develop a license and support model that meets the State's needs.

IBM expects to continually leverage its Cloud Computing capabilities in the ongoing evolution of the IBM HSP and Collaborative Care Solution. One of the features of Cloud Computing is that advances in virtualization and network technology allow services to be deployed in a distributed, location-aware manner. Using these capabilities, referred to as a "hybrid" public-private cloud environment, certain key applications (such as the Master Patient Index application) or databases (such as the document repositories) could reside

in a State of Arkansas data center while the remainder of the solution is deployed and managed in the IBM Cloud. In this manner the State would be able to leverage its investments in application software, as well as retain ownership of patient data, lessening privacy and liability concerns.

5. Core Requirements

1. The **Identity Management Services** component of the HSP Solution includes the Initiate Interoperable Health software, including Initiate Patient™, the market leading Master Patient Index software.

   Initiate's identification solutions are in use by over 200 customers worldwide, touching 80% of the North America population. Initiate's experience spans the healthcare ecosystem, law enforcement/intelligence community and many enterprise markets. Initiate Interoperable Health, the standard for patient registry is:

   - used by 76 integrated delivery networks (IDNs) and over 40 health information exchanges including those in Arizona, California, Florida, Louisiana, New Mexico, New York, North Carolina, North Dakota, Oregon, Tennessee, Virginia and Washington,
   - recognized as the leader in improving the efficiency of claims processing at four of the 10 largest payer organizations, as well as four regional Blue plans,
   - connecting patient records at the largest retail pharmacies in the US, including Walgreens, Wal-Mart and CVS/Caremark, as well as the SureScripts e-prescribing network,
   - supporting six of the Nationwide Health Information Network (NHIN II) and all four of the NHIN I demonstrations funded by the Office of National Coordinator (ONC), and
   - serving as the enterprise master person index or client registry in eight Canadian provinces, supporting the pan-Canadian electronic health record.

   The Initiate software suite provides the accuracy, scalability, and security necessary to support the Health Information Exchange infrastructure for SHARE:

   - Initiate software delivers high performance for different sizes of implementation. One large Initiate implementation enables searches across 8 data sources comprising 7 billion records and returns results in less than 2 seconds.
   - Initiate software delivers high levels of accuracy. Initiate finds, corrects or eliminates duplication and other data quality problems across systems and data sources, saving time and money. Initiate decreased the duplicate rate for one organization from 12 percent to just 0.76 percent.
   - Initiate software provides global coverage. Initiate stores, views and matches data within global languages in multiple character sets, and supports names and languages found in citizens of European, Middle Eastern and Asian descent.

- Initiate software provides comprehensive audit capabilities. Initiate helps the HIE know its patient data, who did what with it, and when. For example, one organization uses Initiate software to manage 4.2 million records through 23,000 transactions per day, with more than 800 employees creating and updating records across the organization.
- Initiate software provides secure data and access control. Initiate gives control over enterprise data with role-based application security and access. Initiate software enables a major financial services firm to manage 60 million records spread across 6,200 locations, helping to protect privacy while enabling better customer satisfaction, retention and cross-selling.

2. **Terminology Services** are utilized in several internal functional areas such as harmonization of document coding (e.g. ICD-9/10, LOINC) to validate coded data contained in clinical documents and document metadata. Where terminology maps from non-standard, local terminologies to standard vocabularies can be created, the Terminology Services can perform the mapping and insert the standard codes in submitted documents, while retaining the original code as well. Implementing standard vocabulary in the HIE enables semantic interoperability of EMR systems, and enables effective document searching, data-analysis, and outbreak detection across data from source systems with disparate coding terminology. Terminology software from **Apelon, Inc**. has been integrated into the IBM HSP Solution offering as the reference component providing terminology mapping services to the HIE. The Apelon Terminology services have a customizable model to handle distinct mappings and preferences per organization. This service is also extensible, allowing for incorporation of new code-sets in a standardized way as needs arise.

   IBM utilizes a subscription service from Apelon, Inc. to receive updates to standard coded vocabularies on a regular basis, and new versions are released by the organizations that maintain them.

3. The **Producer Registration and Management** component in the solution is provided in the IBM HSP solution, supported with services from **Health Market Science**, the primary Clinician-proofing and healthcare provider directory service for the IBM HSP. HMS has a database of over 4.5 million providers, and their Web Services-based approach is highly compatible with the IBM HSP architecture.

4. **Standards Based:** One of the fundamental principles underlying the architecture and implementation of the IBM HSP Solution is a commitment to standards-based integration for healthcare information. The key standards that underlie the HSP architecture are the same set of standards that have been adopted in the United States by the Health Information Technology Standards Panel (HITSP) and approved by the Secretary of Health and Human Services for use in federally-funded healthcare integration activities, including the NHIN. These key "foundational" standards include:

   - Integrating the Healthcare Enterprise (IHE). This includes a set of standards that defines how to perform patient identity queries and cross-referencing (PIX/PDQ profiles), document sharing (XDS), document sharing across HIEs (XCA), and

auditing (ATNA). These profiles in turn reference other standards from, for example, HL7 and ebXML.

- HL7, HITSP, IHE, and NHIN document format and data standards. These standards bodies have defined a set of document and data standards that define common formats and coded terminologies for sharing clinical information. These formats are based on the HL7 Clinical Document Architecture (CDA) and Continuity of Care Document (CCD) standards, and include specific profiles for representing Summary of Episode notes, Laboratory Results, Medication and Allergy History, Personal Health Records, Transfer of Care documents, and other commonly used document types. The IBM HSP Solution supports these formats, and can be configured to enforce (and map where possible) coded elements within documents to the specific coded vocabulary identified in the standards.
- Web Services Interoperability (WS-I) standards that define the transport and security protocols for exchanging information over a public network. These protocols include SOAP, HTTP, SSL/TLS, Web Services Security, XML Digital Signature, and SAML.
  - The IBM HSP Solution supports numerous other healthcare information and technology standards throughout the solution. These notably include HL7 v2.x messaging standards with the ability to convert HL7 v2.x messages to CDA documents.
  - Figure 4 depicts some of the healthcare and technology standards supported by IBM HSP Solution.

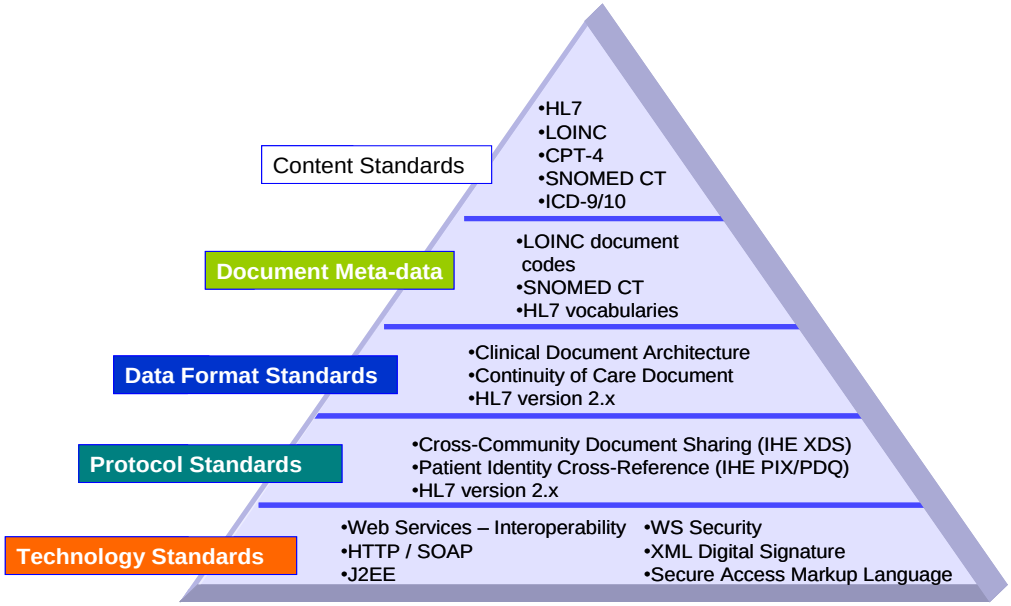

Figure 4: Healthcare Standards Pyramid

5. **Security and Privacy** features of the IBM HSP Solution can be characterized in six categories.

   a) Authentication and Authorization

   Authentication and authorization services provide the facilities for identification of users of the HIE, and for the authorized access to services provided by the HIE. The suite of IBM Tivoli security products, integrated with native services of the IBM WebSphere Application Server J2EE platform, provide services of this category.

   b) Role-based Access Control

   Role-based Access Control provides the capability to control access to documents and data in the HIE based on the user's role in an organization. This capability defines what types of users are allowed to perform which operations within the HIE.

   c) Document level Access Consent

   For users whose role allows them to access clinical data, further restrictions are placed on access to that information by the implementation of fine-grained access consent policies. An access consent policy is the machine-enforceable statement of "who is allowed to see my data". In the IBM HSP Solution, access consent policies may be created by:

   (1) the HIE, to reflect policies that need to be implemented across the jurisdiction of the state

   (2) individual providers or provider organizations, to reflect policies of that institution, or policies regarding the review of clinical information by the physician or other provider before it is released to the patient

   (3) the patient, to reflect each individual's consumer desires to share (or not share) their protected health information with specific users or groups of users.

   Following emerging standards being developed by the NHIN and HITSP, policies may grant or deny access to information based on one or a combination of several dimensions:

   - The role of the requesting user
   - A specific requesting user
   - The organization the requesting user belongs to
   - The class of clinical document
   - A specific clinical document
   - The confidentiality level of the clinical document
   - The purpose of the request (such as treatment, payment, research, or emergency treatment)

These policies are enforced with a level of precedence defined by the operator of the HIE (that is, SHARE), so higher level policies can preempt lower level policies. For example, the state could determine that access for the purpose of emergency treatment is always allowed and cannot be overridden by a patient's policy to the contrary.

d) Basic Message Integrity, Confidentiality and Non-repudiation

Message integrity, confidentiality and non-repudiation are supported through standardized security models utilizing encryption, digital signatures and certificates. Use of these basic security building blocks and applications based on industry standards supports the integrity and confidentiality of data transactions as well as data at-rest. Non-repudiation is addressed using industry standard methods (sign-encrypt-sign) at the source data-provider and persisted to enforce non-repudiation at any later point in time.

e) Support for Distributed Authentication/Authorization

The IBM HSP Solution supports a distributed model of security across HIEs utilizing the Secure Assertion Markup Language (SAML) specification from OASIS. The SAML-enabled HIE architecture provides for the exchange of assertions (Authentication, Attribute and Authorization) across HIEs utilizing security tokens according to the SAML specification. The exchange is controlled by the SAML protocol and achieves a model for "portable trust". This key aspect is one factor that enables the IBM HSP Solution to be operated in a distributed health information exchange environment independent of any centralized services or databases.

f) Auditing

Auditing provides an important link in a complete security infrastructure, and makes it possible to identify abuses of the access to protected health information that the HIE is intended to provide. Transactions that go through the HIE are audited, with each audit record containing the data defined in RFC 3881, "Security Audit and Access Accountability Message XML Data Definitions for Healthcare Applications."

Audit records are stored in a separate database from other information in the HSP and access to the audit records are tightly controlled. Consumer's have access to the audit records related to their own information through a reporting interface. Access to the audit records is also audited.

6. **Flexible:** The common theme of many of the design principles of the HSP Solution is the flexibility that they provide to both HIE customers and IBM as a HIE Service Provider. The SOA architecture on which the HSP Solution is based allows additional services to be integrated in a flexible manner. These services can be provided by IBM, by other vendors, or by participants in the HIE network themselves. The HSP – as the HIE service bus (the "backbone") – provides the user identity and authorization services, patient identity services, and security services these other services can rely on in their implementation.

5.3 Other Features

In addition to the above, are there any other features, services, or options that SHARE should consider? If so, please describe the feature, service, product, or option, and explain how it would support the HIE functionality as described in this RFI.

IBM Collaborative Care Solution

Although the current RFI is centered around an HIE technical infrastructure and connecting electronic health records throughout Arkansas, the long term vision may be the opportunity to reduce the growth of healthcare cost, which is growing at an unsustainable rate, while improving the quality and value of care. With 15 million additional lives being added to the Medicaid roles through the recent healthcare reform legislation, it is imperative that Arkansas utilize the ARRA funds for an HIE as a springboard to change the way healthcare is delivered, and in turn, reduce their Medicaid spend, which is a significant component of the State healthcare budget.
IBM would welcome the opportunity to present and have considered the larger context of our robust, integrated offering for healthcare transformation called the Collaborative Care Solution as a means to:

- meet the requirements for meaningful use and NCQA Medical Home, and
- implement care delivery transformation.

The Collaborative Care Solution is comprised of:

- The IBM Health Information Exchange Service Provider (HSP) Solution (described in detail in the earlier sections of this RFI as the foundation for the States HIE),
- IBM Collaborative Care Health Analytics and Data Warehouse,
- ActiveHealth Management Clinical Decision Support, Active CareTeam, and My ActiveHealth Personal Health Record (PHR).
- The integrated solution delivered via software as a service model. A conceptual picture is depicted below.

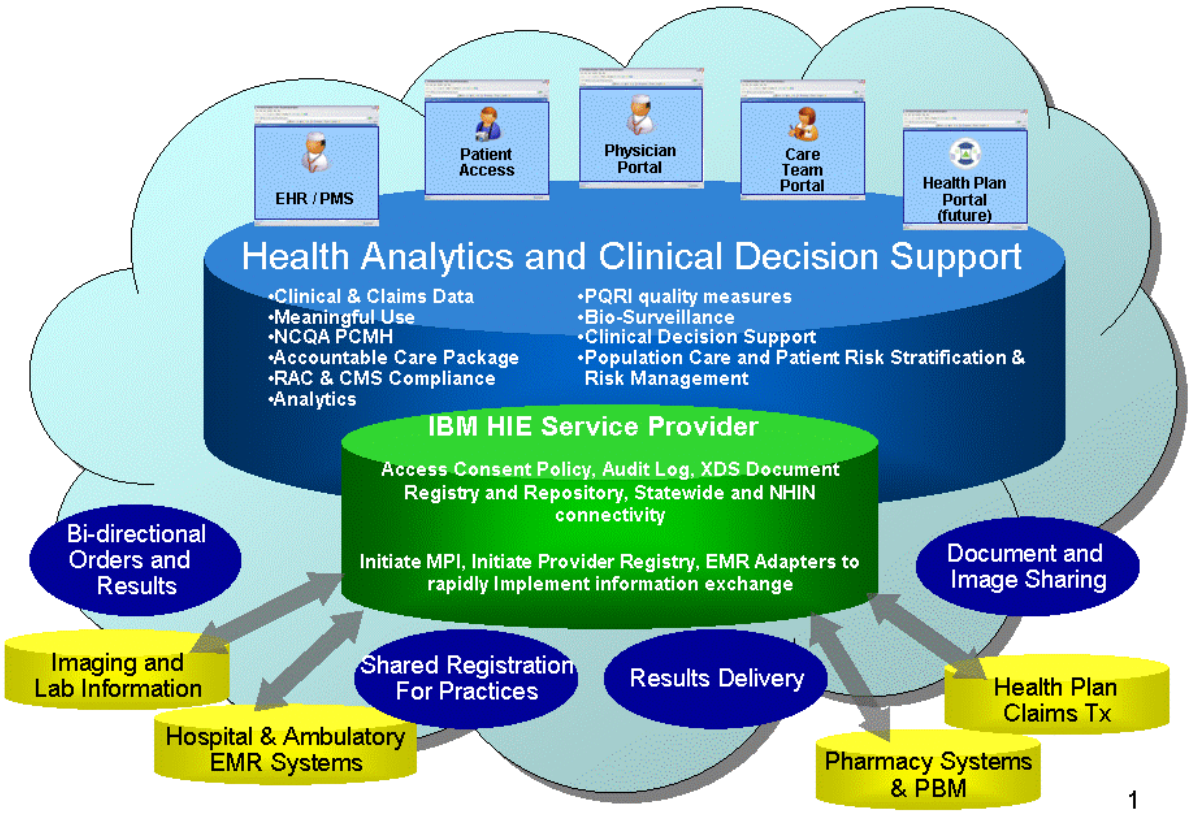

Figure 5: Collaborative Care Solution

The solution provides the approach and technology to support State, Regional and individual stakeholder goals associated with ARRA and ***specifically the Requirements of Meaningful Use***. This unique solution not only provides you with the tools to comply with these baseline requirements – it also offers an opportunity to change the game - to provide healthcare under a patient-centric model that improve outcomes, reduces cost and supports the scalable, robust healthcare model of the future. Amongst the offerings available within IBM Collaborative Care Solution are:

- A **web-based Physician and Care Team application** that provides a "registry" view of a physician's patient panel, with their status against a set of quality metrics.
- A **Personal Health Record** that can be offered to patients to allow them to participate online in the management of their own health and health care information.
- **Advanced Clinical Decision Support**, looking across each patient's entire electronic health record to identify gaps in care, suggested treatments and instances where patients are failing to meet a physician's quality measurement targets.
- **A Healthcare Data Warehouse**, allowing practice medical directors and hospital administrators the ability to compare outcomes and progress against quality metrics by physician, organization, and against state and regional averages.

In partnership with **Aetna** and **ActiveHealth Management**, the Collaborative Care Solution builds upon the sharing of healthcare data enabled by the IBM HSP and facilitates the productive use of healthcare information that can allow healthcare providers to deliver higher quality of care to their patients at a lower cost and meet the state's programmatic goals related to provider "meaningful use" and the creation of Patient Centered Medical Homes. The solution allows its physician users to:

- Detect gaps in care for their patient populations, driven by the evidence-based rules of the **ActiveHealth CareEngine™.**
- Identify appropriate care management or disease management programs to enroll patients in to reduce costly hospitalizations and improve wellness.
- Measure their performance against standardized quality measures, such as National Quality Forum measures or Patient-Centered Medical Home certification measures.
- Give their patients access to their medical records through the MyActiveHealth Personal Health Record (PHR).

ActiveHealth's tools and services include:

CareEngine™: Advanced Clinical Decision Support and Alerts: Along with an aggregated patient medical record drawing on data sources connected to the IBM HSP, ActiveHealth's team of clinical experts continually catalog the recent evidence based medical literature to develop best practices for clinical predictive modeling and clinical decision support. These decision support rules and predictive modeling are coded into the CareEngine, which compares these best practices to the patient medical record to identify gaps or oversights in care. These gaps in care are then communicated to physicians and patients through provider registries, portals, EMRs, and PHRs.

Active CareTeam™ physician registry: ActiveHealth provides a web-based physician registry, called Active CareTeam. The registry provides an on-demand feedback and communication loop for physicians regarding patients within their practice. Patients with validated conditions are listed, allowing drill down viewing into an individual patient profile. Physicians are also able to view gaps in care detected by the CareEngine, the conditions validated by the clinical predictive model, as well as participation in disease or care management programs. This allows physicians to see what interventions are required according to evidence based protocols. ActiveHealth also provides a simple application for physician extenders to conduct interventions. Our tools display disease management and case management applications to be utilized by physicians, physician extenders or nurses, with or without an EMR.

My ActiveHealth PHR Portal: Fully integrated with its clinical decision support application, alerts can be delivered in the PHR both from historical data and in real time (when the user supplies new relevant data). Because these alerts (Care Considerations) are sent by the CareEngine, they embody a superior level of evidence and specificity. ActiveHealth's internal analysis shows a substantial increase in alerts generated via self-reported data from its PHR users. The user can provide feedback on the alert right in the PHR, thus improving the alerts' accuracy (e.g., by stating that the member is allergic or was told not to use the recommended medication, or that they already are taking the medication but the data was missing from the electronic health

record). The My ActiveHealth PHR also includes access to other care management services and tools that may be provided by the practice or other program sponsor (such as an employer or health plan). Outcomes are also improved via "trackers" (e.g., for BMI, blood pressure, exercise, and LDL level) and context-sensitive educational materials are readily available in the My ActiveHealth PHR.

Quality Measure Reporting: Active CareTeam also provides quality performance measures for physicians as an accompaniment to the registry. The Active Performance Measures program provides a quantitative assessment of the quality of care across networks and physicians compared to evidence-based standards and a view of physician performance on standardized measures and in comparison to their peers.
The capabilities of the ActiveHealth suite of applications and the Collaborative Care Solution are not called out by the requirements in this RFI, and thus are not discussed further. However, these applications will give Arkansas healthcare providers the ability to move beyond simply sharing data to using information to improve care for their patients. And while a Health Information Exchange can give health plans access to clinical data for the purpose of approving or denying claims, the Collaborative Care Solution can enable plans to measure the effectiveness of treatment programs and reduce the cost of providing care and keeping Arkansas citizens healthy.

Education and Training

Since the IBM HSP Solution is a hosted offering, operated and maintained by IBM, no external training is required for the core operation of the HIE.

IBM can provide two types of education or training related to the participants of the HIE:

- IBM can offer consulting and training for the State of Arkansas in developing the privacy and security policies, governance, financial planning, and stakeholder relations of the SHARE. Details such as amount and location of these activities would be negotiated between the State and IBM.
- IBM will provide education to healthcare providers and organization in Arkansas regarding implementing the connections to the HIE. This education would include descriptions of the security protocols (such as distributed user authentication), content standards (HL7 CCD and other document formats, as well as the coded healthcare terminologies contained within those documents), and the transaction protocols. Generally, IBM would provide this education through webinars or other remote means, but on-site training would be provided for larger provider organizations or groups of providers.

IBM Qualifications - Leveraging our NHIN and Healthcare Experience

The healthcare industry is one of IBM's strategic markets and we continue to make significant investments in resources, research, and solutions. IBM has long been on the forefront of a structured and standards-based approach and is strongly committed to integration with and between established healthcare vendor partners. Standards-based in this context means integrating with other community exchanges and the NHIN through federally-approved standards

IBM led the response to the U.S. HHS/Office of the National Coordinator for Health Information Technology's (ONC) RFI for the development and adoption of a National Health Information Network (NHIN) as the leader of a broad consortium of IT vendors. Subsequently, IBM responded to the U.S. Department of Health and Human Services RFP and was awarded one of the four NHIN Architecture Prototype contracts in 2005. Subsequently IBM was a subcontractor to two awardees of NHIN Trial Implementations projects in 2007.

IBM was a leader in creating the HIE architecture in our work with the North Carolina Health Information and Communications Alliance (NCHICA) for the NHIN Trial Implementations. With IBM's support, NCHICA met the required technical milestones of the project, including:

- Exchange of summary patient records within the HIE jurisdiction (North Carolina).
- Interoperability testing with the other participants in the Trial Implementation Project, covering seven required and one optional inter-HIE interface.
- Exchange of laboratory results data within North Carolina and with other HIEs across the NHIN.
- Exchange of Personal Health Record information among patients and their care providers through the North Carolina HIE, and the transfer of Personal Health Record information from one PHR application to another.

The first phase of the NHIN Trial Implementations culminated in two public meetings in September and December, 2008. As the only Trial Implementation participant selected to demonstrate the "Consumer Access to Clinical Information" Use Case, focusing on consumer access to and control of healthcare records, NCHICA received a one-hour presentation slot at the December NHIN Forum to showcase their implementation of this consumer-focused scenario. NCHICA, IBM and their other technology partners flawlessly demonstrated the real-time exchange of summary patient records and personal health records among three ambulatory EMR systems, a web-based portal, and two personal health record applications.

IBM has worked with our clients to successfully deliver over 3,000 healthcare transformation initiatives across the world. We have developed robust, secure healthcare systems for many clients; from private organizations to governments. We have successfully been involved in National and state-wide healthcare projects, integration projects across hospitals and to

healthcare systems and have also helped in building business cases and generating stakeholder buy-in. Some of our recent key projects include:

A west coast integrated delivery network (IDN): IBM led the design and implementation of the ambulatory EMR implementation and provided consulting services to assist with the build, testing and deployment of the scheduling application.

A large multi-disciplinary physician practice organization: IBM led the change management / clinical transformation and assisted with the implementation of Allscripts EHR in over 40 ambulatory care clinics.

- General Medical / Surgical Hospital: IBM led the Program Management Office, provided change management services and led the implementation of an EMR solution in the inpatient and outpatient environments.

Breadth and Depth of Experience

Our implementation experience supports risk reduction in the management of this initiative via:

- Existing operational and implementation experience in government healthcare;
- Experience with complex project governance;
- Experienced healthcare leaders providing focused and pragmatic advisory services
- IBM's experiences in large scale healthcare IT projects;
- IBM's project management, processes and implementation tools and methodologies; and
- IBM's established research facilities in Healthcare.

IBM has research professionals and efforts dedicated to the health industry in our Almaden and Watson Research Laboratories in the U.S. and also internationally in our Haifa, Israel Laboratory.

IBM's broad base in healthcare allows us to fulfill diverse needs for a variety of clients:

- Hospitals: Top 14 hospitals from the 2006 "U.S. News & World Report" honor roll
- Healthcare Insurance: 12 of top 13 US companies
- Government: Healthcare projects in US, Canada, Singapore, Denmark, China, India
- Pharmaceutical: 30 of the top 30 companies
- Biotech: 18 of the top 20 companies

We have demonstrated consistent performance in healthcare for the last five years. Our commitment to this industry is very strong with clients – large and small. IBM has deep experience with healthcare payers, providers, social service agencies, and governments at all levels. Across the board, IBM's healthcare solutions are standards-based, secure, and adaptable. We have a dedicated healthcare practice focused on clinical and business process optimization.

Our technology and deep industry expertise have allowed us to partner with prestigious provider organizations to help them create the future of healthcare. We work with the world's leading

academic medical centers, health information exchanges, and public health organizations. We focus on helping healthcare organizations achieve business and clinical performance improvement by enabling the right process with the right technology.

Extensive Experience with Clinical Transformation and Leading-Edge Technologies

IBM helps clients innovate through transformation of their IT and business processes and through deployment of cost effective and optimized IT technologies. IBM provides its customers with choices. One of IBM's key strengths is its ability to integrate solutions with components from other vendors.

IBM Healthcare Consulting is unparalleled in implementing advanced clinical systems. We have in-depth experience of most of the commercial clinical packages and have developed a unique set of tools and methodologies that we bring to implementation. Leading industry analysts are saying that IBM is the #1 integrator of IT environments and in building relationships and in the areas that count – understanding our client's industry, provision of IT services and business and IT strategy consulting.

Unique Qualifications on HIE Implementation

We firmly believe the IBM solution approach can meet your goals and provide the flexibility to also meet the growth requirements of future initiatives. Our IBM Health Information Exchange Service Provider (HSP) Solution provides an exchange capability across your clinical community with limited disruption and change to existing clinical workflows. A HIE provides a sound foundational investment that is:

- A Change Agent: a catalyst for other data exchange
  - Supports variable business models
  - Supports public health needs
  - Lower barriers of entry for other stakeholders to collaborate in and help finance the exchange (e.g. commercial insurers)
- Adaptable: Accommodates addition of new services and features as the initiative matures
  - Flexible ability to ingest various types of data
  - Integrates with multiple EMR vendors used by physician practice and hospitals as well as
  - e-Prescribing exchanges, pharmacies, laboratories, and radiology systems.

Lessons Learned

Many communities, including the State of Arkansas, have embarked on the path of creating Regional Health Information Organizations or Community HIEs in the past couple of years, only to be stopped, or held back from reaching full potential, by some key and critical barriers, such as governance issues, lack of clear business drivers, lack of clarity around standards and the inability to garner support for funding. We believe these barriers have been significantly lessened in today's climate, for the following reasons:

- Governance. Much work has been undertaken to define Medical Trading Areas and understand connections between providers. Models have been created in Arkansas and in other States that can be utilized in framing the organization structure for a statewide exchange. SHARE has built and grown relationships between local providers and regional communities that will be crucial to building a consensus on the HIE.
- Business drivers. Responsiveness to the business drivers for information exchange is built into the architecture of IBM's HIE model. The HIE Architecture anticipates and allows for the exchange of information to mirror the flow of patients through the healthcare system.
- Standards. Standards are becoming functional, broadly known and accepted across the industry, driven by the work of the Office of the National Coordinator and the Health IT Standards Panel (HITSP). Interoperability tool sets are much more robust than they were even a couple of years ago.
- Funding. ARRA provides funding for organizations to create HIEs, removing the initial funding barrier. In addition, ARRA provides funding for providers who can prove meaningful use of an EMR, and then will reduce Medicare reimbursement for providers who cannot prove meaningful use. SHARE will need to be cognizant of the need to implement or certify their EMR applications to qualify for ARRA funding as the HIE implementation proceeds.

Changed National Political Environment

The current state is unsustainable. As U.S. President Barack Obama stated in his inaugural address

"…the cost of our health care has weighed down our economy and the conscience of our nation long enough. So let there be no doubt: health care reform cannot wait, it must not wait, and it will not wait another year."

There is a clear national agenda for this change at this time and ARRA shows the federal government's commitment. As well, the federal government has begun to institutionalize the components required to drive the national agenda, such as:

- ONC. The Office of the National Coordinator for Health Information Technology (ONC) has begun to fulfill its potential. ARRA codifies the ONC and creates a Policy and a Standards committee that should make strides in developing operational and policy guidance for HIEs.
- HITSP. The existence of HITSP to develop interchange standards and data standards for HIE operations. For the first time ever, lack of standards (or diverging standards) is no longer an excuse for not sharing healthcare information.

IBM as a Purchaser of Care

The State of Arkansas has an opportunity to achieve true health reform using the HIE as a springboard for change. In addition to the ability to deliver the technology, IBM brings the experience of a large employer and purchaser of care.

In 2005 IBM began to question the very foundation of the healthcare it buys, and reached a significant conclusion: when compared to other industrialized countries, U.S. healthcare fails to deliver comprehensive primary care.

Consequently, in late 2006, IBM led the formation of the Patient Centered Primary Care Collaborative (PCPCC) when it approached several other large national employers with the objective of creating a more effective and efficient model of healthcare delivery.

The Patient Centered Medical Home (PCMH) approach emphasizes preventative medicine and one-on-one relationships between doctors and patients that foster communication and collaboration. It has been demonstrated that chronic disease patients within a medical home reduce their healthcare expenditure anywhere between 20-50 percent.

Staying true to our commitment to PCMH and overall healthcare reform, IBM announced in November 2009, that it will now pay for 100 percent of the primary health care coverage of its U.S. employees. IBM moved to spend more upfront to prevent disease so that we can spend less on more costly disease treatment down the road.

We are convinced that making such a sweeping change to our employee health insurance plan will save millions. In fact, the $79 million we have already invested in wellness programs between 2004 and 2007 has saved the IBM Corporation $191 million in health-related costs and improved productivity.

Because we are a large purchaser of care, IBM has invested in a model which has proven to reduce healthcare costs. We believe that this experience can assist the State of Arkansas to realize a reduction in their overall healthcare spend for large employers, like Wal-Mart and Tyson Foods, as well the State Medicaid fund.

We look forward to working with you closely both as a solutions provider and as a stakeholder in the healthcare ecosystem for Arkansas.